

Claims

What is claimed is:

1. A device that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, said device comprising: a) a flexible, sterile tube containing culture medium, b) a system of movable gates (clamps) that divide the tube into separate regions containing spent culture (downstream region), growing culture (growth chamber), and fresh growth medium (upstream region), c) a means of moving the gates and the tubing such that a portion of the growth chamber and the associated culture can be clamped off and separated from the growth chamber, and such that a portion of fresh tubing containing unused medium can be joined with a portion of the culture and associated medium already present in the growth chamber.
2. The device according to claim 1, wherein the tubing is flexible to allow clamping and segregation into separated chambers.
3. The device according to claim 1, wherein the tubing is gas permeable, for example comprised primarily of silicon, to allow gas exchange between the cultured organism and the outside environment, according to the type of experiment.
4. The device according to claim 1, wherein the tubing is gas impermeable, to prevent gas exchange between the tubing and the outside environment, if the experiment demands anaerobiosis.
5. The device according to claim 1, wherein the tubing is transparent or translucent, to allow the measurement of turbidity.
6. The device according to claim 1, wherein the growth chamber tubing and associated media and culture can be depressurized or over pressurized relative to ambient atmosphere as necessitated by experimental requirements.
7. The device according to claim 1, wherein the tubing allows the measure of pH of medium by inclusion of a pH indicator in the tubing composition or lining.
8. The device according to claim 1, wherein the growth chamber tubing and associated media and culture can be heated or cooled as appropriate for experiment conditions.

9. The device according to claim 1, wherein the growth chamber tubing and associated media and culture can be kept motionless or agitated by any already known method.
10. The device according to claim 9 wherein the tubing can include one or several stirring bars for agitation purpose.
11. The device according to claim 1 wherein regions of the tubing can be confined in a specific and controlled atmospheric area to control gas exchange dynamics.
12. The device according to claim 1 wherein the growth chamber tubing and associated media and culture can be tilted either downward to remove aggregated cells, or upward to remove air through the functions described in claim 1-c.
13. A method that increases the rate of reproduction (through increased speed of reproduction and/or increased reproductive yield) of living cells in suspension or of any culturable organisms through the process of natural selection, comprising: a) providing an initial culture in the described growth chamber through sterile injection of a starter culture into a sterile tube containing sterile growth medium; b) maintaining growth conditions according to experimental requisites ; c) after a certain period of time and associated growth of the culture, adjusting the position of the described gates so as to move equal portions of fresh medium and of grown culture (respectively) into and out of the region defined as the growth chamber, allowing the remaining portion of grown culture to mix with the introduced portion of fresh medium and continue to grow; d) reproducing steps b) and c) until the end of experiment to achieve continuous culture and selection of variants with increased reproductive rates; e) withdrawing on demand a sample of grown culture from sampling chamber.
14. A method according to claim 13 wherein applying a simultaneous peristaltic movement of the gates, the tubing, and the medium and culture within the tubing, allows provision of a certain quantity of fresh medium to the growth chamber while an equal quantity of culture is isolated and removed through the other extremity of said growth chamber, terminating a growth cycle and starting a new one.
15. A method according to claim 13 wherein an experiment can include as many growth cycles as required by the experimenter without possible contamination of isolated growing chamber and without possible proliferation of a dilution-resistant population.

16. A method according to claim 13 such that during the operations the experimenter can maintain growth conditions according to experimental requisites which may include temperature, pressure, optical density, chemical acidity, agitation and aeration with various gases.

17. A method according to claim 13 wherein a combination of tilting the device and operating agitators leads to an appropriate agitation for mixing the growing culture in order to prevent or repress aggregation of living organisms.